

# High Efficiency Three Phase Resonant Conversion for Standardized Architecture Power System Applications, Phase I

Completed Technology Project (2006 - 2006)



## Project Introduction

A low-cost, standardized-architecture power system is proposed for NASA electric propulsion (EP) applications. Three approaches are combined to develop a system that will meet current and future NASA needs and exceed currently available power processor unit (PPU) performance in terms of electrical efficiency, specific mass (kg/kW), and cost. The approaches include the use of (a) high-efficiency, 3-phase, dc-dc converters to minimize cooling requirements, mass, and parts count and maximize reliability and efficiency, (b) modularized and standardized sub-system design and fabrication techniques to accommodate power output scaling and re-configuration for specific ion thruster designs without the need to re-qualify hardware, and (c) attention to cost and manufacturability issues that will allow the implementation of electric propulsion systems on future NASA missions without the hidden costs of "hard-to-build" and "hard-to-scale" designs that are currently available. The innovations proposed herein will allow NASA to obtain the flexibility and performance it needs in power processors for electric propulsion systems while ensuring that their cost and difficulty of fabrication is low.

## Anticipated Benefits

Potential NASA Commercial Applications: Non-NASA uses for the proposed idea are commercial applications for space power where low cost and high efficiency are desired. Again the same advantages apply here. The most notable being the wide utility and range. This wide range converter will reduce the number of different model types required to satisfy current and future EP thruster needs. One immediate non-NASA application is for Aerojet thrusters that are being developed for geosynchronous satellite use.



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## Organizational Responsibility

### Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

### Lead Center / Facility:

Jet Propulsion Laboratory (JPL)

### Responsible Program:

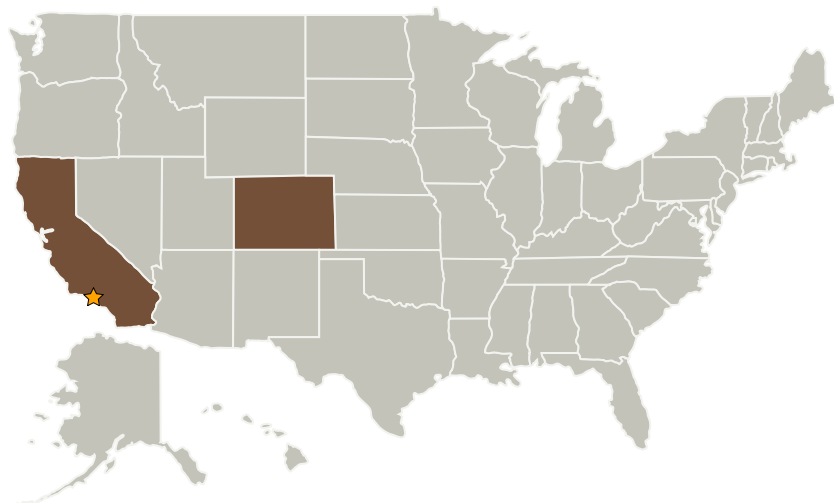
Small Business Innovation Research/Small Business Tech Transfer

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## Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★ Jet Propulsion Laboratory (JPL)	Lead Organization	NASA Center	Pasadena, California
Colorado Power Electronics, Inc.	Supporting Organization	Industry Veteran-Owned Small Business (VOSB)	Fort Collins, Colorado

## Primary U.S. Work Locations

California	Colorado
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## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

Carlos Torrez

**Principal Investigator:**

Geoffrey N Drummond

## Technology Areas

**Primary:**

- TX03 Aerospace Power and Energy Storage
  - └ TX03.3 Power Management and Distribution
    - └ TX03.3.3 Electrical Power Conversion and Regulation